DEPARTMENT OF
FISHERIES AND WILDLIFE
WESTERN AUSTRALIA

# REPORT Nº 64

Published by the Director of Fisheries and Wildlife, Perth,
under the authority of the Hon. Minister for Fisheries and Wildlife

LIBRARY
JUL 15 1986
National Marine Fisheries Service
2570 Dole Street
Honolulu, Hawaii

# The Western Rock Lobster Fishery 1977–1978

BY
R. S. BROWN
AND
E. H. BARKER

PERTH
WESTERN AUSTRALIA

1984

Digitized by the Internet Archive
in 2025

https://archive.org/details/wa-fisheries-research-reports_1984_64

Department of Fisheries and Wildlife

108 Adelaide Terrace

PERTH

# REPORT

No. 64

# THE WESTERN ROCK LOBSTER FISHERY 1977-78

BY

R.S. BROWN

AND

E.H. BARKER

1984

ISSN 0726 - 0733
ISBN 0 7309 0321 4

34493—1

CONTENTS


| | | Page |
|---|---|---|
| I | INTRODUCTION | 5 |
| II | METHODS | 5 |
| III | RESULTS | 5 |
| | A. Catch and Effort Data | 5 |
| | B. Exports and Grade Categories | 6 |
| | C. Mean Size | 7 |
| | D. Number of Boats | 7 |
| | E. Forecast of 1977/78 Recruitment | 7 |
| | F. Introduction of New Legislation | 7 |
| | G. Effects of New Legislation | 8 |
| | H. Innovations to Boats and Gear | 8 |
| | I. Bait | 9 |
| | J. Distribution of Fishing | 9 |
| | K. Average Number of Days Worked per Boat per Month | 9 |
| | L. Price of Rock Lobsters | 10 |
| | M. Market Trends and Economic Factors | 10 |
| | N. Average Value per Pot on Pot Redistribution | 10 |
| | O. Sea Water Temperatures and Salinities | 10 |
| | P. Spawning Rock Lobsters | 11 |
| IV | DISCUSSION | 11 |
| V | ACKNOWLEDGEMENTS | 11 |
| V1 | REFERENCES | 12 |

TABLES


| | | Page |
|---|---|---|
| 1. | Catch (in kg weight) and fishing effort (in pot lifts) for the 1977/78 Rock Lobster Season in Various Statistical Blocks | 13 |
| 2. | Catch (kg) per Unit of Fishing Effort (i.e., kilogram of Rock Lobsters per Pot Lift) Data for 1977/78 Season in Various Statistical Blocks (see figure 2) | 14 |
| 3. | Mean Carapace Lengths (mm) of Male and Female Rock Lobsters in Various Depth Categories at Fremantle, Lancelin, Jurien and Dongara throughout the Fishing Season | 15 |
| 4. | Bottom Temperature ($^{o}$C) and Surface Salinity in Parts per Thousand for Fremantle, Lancelin, Jurien and Dongara of Waters between Various Depth Contours for the 1977/78 Season | 16 |
| 5. | 1977/78 Sex Ratio by Month and Depth Category, Figures are % of Females in the Total Sampled Catch | 17 |


FIGURES


| | | |
|---|---|---|
| 1. | Rock Lobster Catch (kg), Fishing effort (pot lifts) and Catch per Unit of Fishing Effort (c/g) Data | 18 |
| 2. | Rock Lobster Fishing Areas and Australian Bureau of Statistics Blocks | 19 |
| 3. | Length Frequency of Breeding Female Rock Lobsters Taken from December 1977 to February 1978 | 20 |




34493—2

# THE WESTERN ROCK LOBSTER FISHERY 1977-78

R.S. Brown and E.H. Barker
Western Australian Marine Research Laboratories
P.O. Box 20, North Beach, Western Australia 6020.

## I INTRODUCTION

The fishery for the western rock lobster *Panulirus cygnus* is one of the most important single fisheries in Australia and an important export earner for the State. The fishery is governed by a complex set of regulations which have been reviewed by Bowen (1971) and which are designed to limit the total fishing effort to acceptable levels and to enforce a legal minimum size. It is thus important to constantly monitor the state of the fishery both to ensure that the effort is remaining within the accepted limits and that the regulations are adequately performing their function of maintaining reasonably stable catches (Hancock, 1981). Inherent in this monitoring of the fishery is a careful examination of fishing practice, gear, etc. which may lead to increases in efficiency which may not be detectable through the usual calculations of fishing effort figures.

This paper is the seventh of a series of annual reviews of the previous rock lobster season which will discuss fishing practice, catches, fishing effort, mean size and various other factors, a knowledge of which will help towards a better understanding of the status of the fishery.

## II METHODS

Catch and fishing effort data were extracted from figures supplied by the Australian Bureau of Statistics and also from research log book data, while mean size information was gathered from measurements made by Departmental Research Staff aboard commercial vessels fishing from Dongara, Jurien, Lancelin and Fremantle. Information on trends in fishing practice was gathered principally from conversation with fishermen at various ports as well as from comments made in research log books.

## III RESULTS

### A. CATCH AND EFFORT DATA

The coastal fishing season extends from 15 November to 30 June and may be subdivided into two distinct phases, viz. (i) The "whites" fishery (George, 1958) which begins suddenly in late November (as pale-coloured newly-moulted rock lobsters leave the shallow reef areas) and arbitrarily finishes on 31 December; and (ii) the "coastal red" fishery which begins on 1 January and ends on 30 June. The season in the Abrolhos Islands fishery is restricted to the period 15 March to 30 June.

In previous fishing seasons both the coastal and the Abrolhos Islands fisheries ended on 15 August. The season was shortened by six weeks in 1977/78 as a conservation measure (Hancock, 1981).

In 1977 the "whites" run commenced on about 24 November in Fremantle and Jurien and slightly earlier, about 20 November, in Geraldton.

Catches (kg) and fishing effort (in number of pot lifts) were as follows:

| | |
|---|---|
| "Whites" catch (15 Nov-31 Dec) | 3 423 936 kg |
| "Whites" effort (15 Nov-31 Dec) | 2 768 244 pot lifts |
| "Coastal Reds" catch (1 Jan-30 June) | 5 095 676 kg |
| "Coastal Reds" effort (1 Jan-30 June) | 6 588 425 pot lifts |
| Abrolhos catch (15 Mar-30 June) | 1 527 630 kg |
| Abrolhos effort (15 Mar-30 June) | 1 239 196 pot lifts |
| Total catch | 10 047 242 kg |
| Total effort | 10 595 865 pot lifts |

These figures do not include unrecorded sales (i.e. rock lobsters which are sold for cash, etc. and are not recorded in the fisherman's monthly returns of catches, which totalled approximately 501 600 kg), or the total amateur catch which is estimated at approximately 200 000 kg. Figure 1 shows comparative catch, fishing effort, i.e. the number of pot lifts†, and catch per fishing effort data from previous years.

Catch and effort data from various statistical blocks (Figure 2) are shown in Table 1 with catches expressed in kg weight and fishing effort as number of pot lifts. Table 2 shows catch per pot lift data for the same statistical blocks. The total fishing effort was 10 595 865 units of fishing effort, 5.0% less than the 1976/77 season.

*

## B. EXPORTS AND GRADE CATEGORIES

Rock lobster tails processed for export are graded by weight and packed in 11.34 kg cartons. The various grades, together with the percentage of cases packed in each grade for the period November 1977 to June 1978, were as follows:

| Grade | % of cases |
|---|---|
| A (140 - 179 grams) | 28.9 |
| B (180 - 239 grams) | 42.3 |
| C (240 - 279 grams) | 12.1 |
| D (280 - 359 grams) | 6.7 |
| E (360 - 479 grams) | 5.3 |
| F (480 - 599 grams) | 3.6 |
| G (600 - grams) | 1.0 |

†Fishing effort is the raw fishing effort and is measured as the number of pot lifts (pulls) recorded by fishermen in their Australian Bureau of Statistics monthly returns. In previous annual reports fishing effort was calculated using a method described by Gulland (1969) which gave effective fishing effort.

*Section B is based on data provided by selected processing establishments from Fremantle to Geraldton.

## C. MEAN SIZE

Samples of rock lobsters were measured aboard commercial vessels using standard pots with 54 mm escape gaps in four depth categories at various ports. The sample would hence include all commercial size rock lobsters, plus undersize which would have been reduced in number by selection by the escape gap (Bowen, 1963). Mean carapace lengths of males and females in the various depth categories at Fremantle, Lancelin, Dongara and Jurien throughout the fishing season have been compared in Table 3. The many omissions in the table are due to either fishermen not fishing the area in question or to some circumstance (breakdown, etc.) which prevented the data from being collected.

## D. NUMBER OF BOATS

The number of boats licensed in zones A,B,C,D and E to fish for rock lobsters is carefully controlled, though boat owners are able to nominate their choice of fishing area, viz. north or south of 30°S.

Number of boats licensed in 1977/78 = 802
Number of boats licensed north of 30°S = 389
Number of boats licensed south of 30°S = 413

## E. FORECAST OF 1977/78 RECRUITMENT

The increased settlement of puerulus larvae during late 1973 resulted in high recruitment to the commercial fishery and subsequent high catch rates during the 1977/78 season.

## F. INTRODUCTION OF NEW LEGISLATION

As a result of continuing increases in fishing effort and for reasons of stock conservation the 1977/78 season was closed on 30 June instead of 15 August, which was the previous closing date. The early closure applied to both the coastal and Abrolhos Islands fisheries. Opening dates for both fisheries remained the same, viz. 15 November and 15 March respectively.

As from the commencement of the 1977/78 season, the breakdown policy for disabled boats was amended on a trial basis to cover the full season; previously it was limited to two periods within the 1975/76 and 1976/77 seasons, viz. 15 November to 15 January and 1 March to 30 April.

As from 7 April 1978 the area definitions of the three research areas situated at Seven Mile Beach, Jurien Bay and Garden Island were re-defined and for reasons of convenience were included in the one notice. The taking of rock lobsters in these areas is totally prohibited to all persons.

Information regarding these changes to the legislation governing the rock lobster fishery, as well as the Department of Fisheries and Wildlife's policies on various issues, may be found in the following volumes of the Fishing Industry News Service (F.I.N.S.)

Vol. 10 No. 2 (Dec 1977) pp. 18, 29, 30, 31.

Vol. 11 No. 1 (Mar 1978) pp. 8, 9, 29, 30.

## G. EFFECTS OF NEW LEGISLATION

As a result of closing the season six weeks earlier the total number of pot lifts decreased from 11 148 290 in 1976/77 to 10 595 865 in 1977/78, a reduction of 552 425 pot lifts or 5.0%. It also had the effect of closing that portion of the season in which effort had been shown to be increasing significantly and in which it had the greatest potential for increase.

The other changes in the legislation were of an administrative nature and hence had little direct effect on levels of catch and fishing effort.

## H. INNOVATIONS TO BOATS AND GEAR

Data supplied by the Harbour and Light Department showed that a total of 87 rock lobster boats were replaced during the period 1 July 1977 to 30 June 1978. In the northern area a total of 43 boats were replaced and ranged in size from 7.01 metres to 15.54 metres with an average size of 10.61 metres, whilst in the southern area a total of 44 boats were replaced ranging in size from 7.62 metres to 15.54 metres and averaging 11.72 metres in length. As in the 1976/77 season the trend in the northern area was towards small to medium sized vessels constructed mainly of fibreglass, whilst in the southern area the trend was again toward medium sized vessels also constructed mainly of fibreglass. During this period there was an increase of 47.5% on the number of boats replaced during the 1976/77 season. The boat replacements were constructed as follows:

| | WOOD | FIBREGLASS | ALUMINIUM |
|---|---|---|---|
| Geraldton | 9 | 33 | 2 |
| Fremantle | 2 | 33 | 8 |
| | 11 | 66 | 10 |

Data from research log books showed the following usage of various types of pots by fishermen north and south of 30°S:

| | STICK AND CANE BEEHIVE | BATTEN | STEEL BEEHIVE | PLASTIC |
|---|---|---|---|---|
| North | 9% | 88% | 3% | - |
| South | 59% | 30% | 10% | 1% |

Traps (large steel and wire mesh pots with side entrances constructed of trawl mesh) gained in popularity, especially in the southern sector of the fishery.

Small numbers of plastic pots continued to be used.

## I. BAIT

Data from research log books* showed the following usage of bullock hocks and pieces of cattle hide as holding bait in both northern and southern areas.

| | HOCKS | HIDES |
|---|---|---|
| North | 67% | 33% |
| South | 42% | 58% |

In the northern area of the fishery the most popular fish baits used in conjunction with bullock hocks and pieces of cattle hide were Australian herring or ruff (*Arripis georgianus*), Australian salmon heads (*Arripis trutta esperi*), mullet (*Mugil cephalus*), scaly mackerel (*Amblygaster postera*) and pilchards (*Sardinops neopilchardus*). In the southern area the most popular fish baits used also in conjunction with hocks and hides were Australian salmon, mullet, pilchards, Australian herring or ruff, tuna heads or pieces of tuna meat and scaly mackerel. Many other fish baits were used during the 1977/78 season, and included fish baits produced by Southern Ocean Fish Processors from fish trawled in the Great Australian Bight.

A prepared rock lobster bait, Craylure, continued in use throughout the season.

## J. DISTRIBUTION OF FISHING

The distribution of fishing is shown in Table 1. The pattern of fishing does not vary greatly from season to season and is dependent on the density of rock lobsters in the various depth categories. Throughout the season the usual pattern of fishing occurred, i.e. concentrated in the shallows during November and December, followed by deep water potting during the latter part of December, January and February, back to the shallows during the latter part of February, March and April and in mixed depths (mainly shallower), depending on weather and density of rock lobsters, throughout the remainder of the season.

## K. AVERAGE NUMBER OF DAYS WORKED PER BOAT PER MONTH

| Month | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|---|---|
| Days Worked | 13.1 | 25.2 | 18.1 | 20.4 | 23.0 | 21.5 | 19.1 | 16.1 |

The average number of days worked per boat per month during November and December was 3.2% up on the 1976/77 season and for the period January to June was 15.7% up on the 1976/77 season.

The average number of days worked per boat per month for the 1977/78 season was 19.7, which was an increase of 12.6% on the 1976/77 season.

*Twenty percent of skippers voluntarily submitted rock lobster research records during the 1977/78 season..

## L. PRICE OF ROCK LOBSTERS

Price to fishermen ranged from $4.50 to about $4.74 per kg.

The range of prices paid on the New York wholesale market:

| Grade | $Aust. per kg |
|---|---|
| A 5 - 6 oz (140 - 179 grams) | 14.10 - 15.44 |
| B 6 - 8 oz (180 - 239 grams) | 14.10 - 15.14 |
| C 8 - 10 oz (240 - 279 grams) | 14.01 - 14.83 |
| D 10 - 12 oz (280 - 359 grams) | 13.91 - 14.93 |
| E 12 - 16 oz (360 - 479 grams) | 12.74 - 14.09 |
| F 16 - 20 oz (480 - 599 grams) | 12.11 - 13.79 |
| G over 20 oz (600 - grams) | 11.78 - 13.23 |

## M. MARKET TRENDS AND ECONOMIC FACTORS

Although some of the larger sizes from the previous season were available in U.S. warehouses when the 1977/78 season opened there was sufficient inducement to airfreight token quantities of the smaller sizes. Just as in 1977 prices settled back to the closing levels of the previous season and very little price fluctuation was evident during the shipping year. Despite an increase in production, prices rose by more than 5% towards the end of the calendar year which augured well for the commencement of 1978/79 season. It should be noted that at these higher price levels the gap has considerably widened between the small and large sized tails. In fact the larger sizes remain sluggish even though at discounted prices.

With the strengthening of the Yen, Japan has been taking more whole boiled rock lobsters but unfortunately their preference is also for the smaller animals. Following trial shipments during the 1976/77 season, shipments of live rock lobster to Japan began in earnest during the 1977/78 season.

The U.S. dollar weakened against the Australian dollar compared with the previous year by about 4%.

## N. AVERAGE VALUE PER POT ON POT REDISTRIBUTION

From about $450 to $880.

## O. SEA WATER TEMPERATURES AND SALINITIES

These have relevance to the behaviour and catch rates of rock lobsters (Morgan, 1974). The average sea water temperature during the rock lobster season (i.e. 15 November to 30 June) at Waterman (aquarium intake temperature) was 22.2°C, with a maximum of 24.6°C on 12 February and 5 March 1978 and a minimum of 17.7°C on 25 June 1978. The average salinity during the season at Waterman (aquarium) was 35.58‰ with a maximum of 36.27‰ on 13 February 1978 and a minimum of 34.69‰ on 26 June 1978.

Bottom temperatures and surface salinities in waters of various depths in the Fremantle, Lancelin, Jurien and Dongara areas were collected as part of the monitoring of rock lobster catches (Item B) and are shown in Table 4. Other records are maintained by CSIRO.

P SPAWNING ROCK LOBSTERS

While most of the breeding females are found in the 20-30 fathom range, no variation has been observed in the size at first breeding from one depth category to another, except at Jurien over 30 fathoms (Chittleborough, pers. comm.). Hence the data for December, January and February from all depths with the exception of Jurien over 30 fathoms may be pooled to indicate the size frequency of breeding (i.e. "berried" and mated) females and this has been done in Figure 3. The mean size of breeding females was greater at Fremantle and Lancelin than at either Jurien or Dongara with the mean sizes being 98.9 mm for Dongara, 84.6 mm for Jurien, 101.3 mm for Lancelin and 110.7 mm for Fremantle. By comparison the mean sizes at first breeding (i.e. the smallest carapace length at which 50% have been mated) were found to be 93.7 mm at Fremantle, 101.2 mm at Lancelin and 96.8 mm at Dongara. There was insufficient data for Jurien.

## IV DISCUSSION

As a result of higher recruitment to the commercial fishery, which resulted from a higher puerulus settlement four years earlier, the 1977/78 catch increased by 7.9% on the 1976/77 catch to 10 047 242 kg.

In an attempt to halt the continuing increase in fishing effort and to prevent any further increase in fishing effort during the latter part of the season (where the greatest potential for increases in effort lay) the season was closed six weeks early. This resulted in fishermen fishing harder to compensate for the early closure, hence there was a 5.0% decrease in the fishing effort instead of the 9.0% decrease that could have been achieved if fishermen had not increased the average number of days worked per boat per month by 12.6%.

The high level of boat replacements reflected the Federal Government's Income Tax Investment Allowance Scheme as well as the buoyant economic conditions within the industry. As a result of the appreciaton of the Australian dollar against the American dollar the price paid to fishermen for their catch was less than the 1976/77 season. The price of fuel rose significantly whereas the price of the various lines of bait only rose slightly on the previous season.

## V ACKNOWLEDGEMENTS

Measurements aboard fishing vessels were performed by Mr R. Bell, Mr G. Lymn and Mr M. Burkett. The information on Market Trends and Economic Factors was provided by Mr R.D. Harrison of Craig Mostyn and Co. Pty Ltd.

# VI REFERENCES


Bowen, B.K. (1963) - Preliminary report on the effectiveness of escape-gaps in crayfish pots. *Fisheries Dept. Western Australia, Rep. No. 2.*

Bowen, B.K. (1971) - Management of the western rock lobster (*Panulirus longipes cygnus*, George) Proc. 14th Sess. Indo-Pacif. Fish. Coun., Bangkok, 139-154.

George, R.W. (1958) - The status of the "white" crayfish in Western Australia. *Aust. J. Mar. Freshw. Res., 9,* 537-545.

Gulland, J.A. (1969) - Manual of methods for fish stock assessment. *FAO Man. in Fish. Sci. 4 FAO,* Rome, Italy.

Hancock, D.A. (1981) Research for management of the Rock Lobster Fishery of Western Australia. *Proc. Gulf Carib. Inst.* 33,207-229.

Morgan, G.R. (1974) - Aspects of the population dynamics of the western rock lobster, *Panulirus cygnus* George II Seasonal changes in the catchability coefficient. *Aust. J. Mar. Freshw. Res. 25,* 249-259.

TABLE 1: CATCH (IN KG WEIGHT) AND FISHING EFFORT (IN POT LIFTS) FOR THE 1977/78 ROCK LOBSTER SEASON IN VARIOUS STATISTICAL BLOCKS.

| BLOCK | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 2612 | - | - | 710 | 731 | - | - | - | - | 1441 |
| | - | - | (1400) | (1800) | - | - | - | - | (3200) |
| 2613 | - | - | - | 1897 | - | - | - | - | 1897 |
| | - | - | - | (1800) | - | - | - | - | (1800) |
| 2712 | - | 2861 | 6822 | 1686 | - | - | - | - | 11369 |
| | - | (1890) | (4642) | (1836) | - | - | - | - | (8368) |
| 2713 | 8629 | 35620 | 23837 | 25821 | 50921 | 47170 | 37409 | 23976 | 253383 |
| | (12635) | (32064) | (33862) | (30508) | (39492) | (37675) | (38018) | (26378) | (250632) |
| 2714 | 9032 | 31137 | 4847 | 13487 | 14340 | 15423 | 14303 | 7280 | 109849 |
| | (12925) | (30741) | (12020) | (8259) | (15257) | (15681) | (17491) | (11749) | (124123) |
| 2812 | - | - | - | - | - | - | 1066 | - | 1066 |
| | - | - | - | - | - | - | (1566) | - | (1566) |
| 2813 | 1299 | 4482 | 3946 | 4893 | 607309 | 603696 | 222811 | 93814 | 1542250 |
| | (1995) | (5520) | (4637) | (8658) | (289577) | (453009) | (330582) | (166028) | (1260006) |
| 2814 | 160249 | 255478 | 69370 | 85388 | 102829 | 61477 | 61147 | 46328 | 842266 |
| | (162816) | (263615) | (135129) | (148669) | (118327) | (89245) | (84090) | (77111) | (1079002) |
| 2912 | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - |
| 2913 | 700 | 12884 | 3700 | - | 25636 | 26007 | 25067 | 1665 | 95659 |
| | (1157) | (9826) | (1700) | - | (13973) | (21360) | (16045) | (4770) | (68831) |
| 2914 | 303817 | 776380 | 196071 | 243984 | 304314 | 207966 | 136213 | 96510 | 2265255 |
| | (281403) | (487723) | (280921) | (322363) | (255028) | (213660) | (181473) | (145847) | (2168418) |
| 3012 | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - |
| 3013 | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - |
| 3014 | 94529 | 548207 | 177642 | 127358 | 284514 | 158682 | 75100 | 57671 | 1523703 |
| | (133956) | (308122) | (207780) | (212945) | (286733) | (196183) | (136094) | (98563) | (1580376) |
| 3015 | 30364 | 93350 | 50557 | 49240 | 91670 | 38710 | 13068 | 11385 | 378344 |
| | (37928) | (61868) | (69963) | (67861) | (86479) | (59372) | (28212) | (20584) | (432267) |
| 3112 | - | - | 3435 | 2559 | - | - | - | - | 5994 |
| | - | - | (2820) | (2820) | - | - | - | - | (5640) |
| 3113 | - | - | 4729 | - | - | 874 | 983 | - | 6586 |
| | - | - | (6864) | - | - | (2006) | (1900) | - | (10770) |
| 3114 | 14810 | 66132 | 23836 | 27356 | 58249 | 28145 | 5301 | 1746 | 225575 |
| | (12062) | (53234) | (34066) | (44532) | (58768) | (22887) | (9036) | (5532) | (240117) |
| 3115 | 161592 | 542348 | 261437 | 332614 | 332833 | 158790 | 113928 | 90128 | 1993670 |
| | (210329) | (422280) | (347023) | (405087) | (397299) | (288290) | (228537) | (165202) | (2464047) |
| 3212 | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - |
| 3213 | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - |
| 3214 | - | 2654 | 6257 | 2977 | 4618 | 2828 | 1323 | 1569 | 22226 |
| | - | (2200) | (5635) | (2640) | (5280) | (3736) | (2730) | (2100) | (24321) |
| 3215 | 47791 | 211184 | 87992 | 100886 | 97671 | 48914 | 47713 | 46585 | 688736 |
| | (63637) | (148697) | (108486) | (121212) | (123283) | (92096) | (73567) | (58513) | (789491) |
| 3314 | - | 344 | 10915 | 7695 | 7780 | 2468 | 1565 | 679 | 31446 |
| | - | (490) | (8081) | (6979) | (7564) | (3651) | (2932) | (1476) | (31173) |
| 3315 | 659 | 7404 | 10626 | 6393 | 5501 | 1996 | 7770 | 6178 | 46527 |
| | (1245) | (7886) | (9563) | (6671) | (5822) | (3039) | (7747) | (9744) | (51717) |
| 3414 | - | - | - | - | - | - | - | - | - |
| | - | - | - | - | - | - | - | - | - |
| TOTAL | 833471 | 2590465 | 946729 | 1034965 | 1988185 | 1403146 | 764767 | 485514 | 10047242 |
| | (932088) | (1836156) | (1274592) | (1394640) | (1702882) | (1501890) | (1160020) | (793597) | (10595865) |

TOTAL CATCH = 10047242 KG

TOTAL EFFORT = 10595865 POT LIFTS

Effort figures are shown in parenthesis and Catch figures are underlined

Not included in these Catch figures are 5245 KG of Rock Lobsters taken by diving.

These figures are derived from data kindly provided by the Australian Bureau of Statistics, and reflect slightly more intensive editing by the Data Processing Section of the Department of Fisheries and Wildlife.

TABLE 2: CATCH (KG) PER UNIT OF FISHING EFFORT (I.E. KILOGRAM OF ROCK LOBSTERS PER POT LIFT) DATA FOR 1977/78 SEASON IN VARIOUS STATISTICAL BLOCKS (SEE FIGURE 2)

| Block | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | Jun | Total |
|---|---|---|---|---|---|---|---|---|---|
| 2612 | * - | - | 0.51 | 0.41 | - | - | - | - | 0.45 |
| 2613 | - | - | - | 1.05 | - | - | - | - | 1.05 |
| 2712 | - | 1.51 | 1.47 | 0.92 | - | - | - | - | 1.36 |
| 2713 | 0.68 | 1.11 | 0.70 | 0.85 | 1.29 | 1.25 | 0.98 | 0.91 | 1.01 |
| 2714 | 0.70 | 1.01 | 0.40 | 1.63 | 0.94 | 0.98 | 0.82 | 0.62 | 0.89 |
| 2812 | - | - | - | - | - | - | 0.68 | - | 0.68 |
| 2813 | 0.65 | 0.81 | 0.85 | 0.57 | 2.10 | 1.33 | 0.67 | 0.57 | 1.22 |
| 2814 | 0.98 | 0.97 | 0.51 | 0.57 | 0.87 | 0.69 | 0.73 | 0.60 | 0.78 |
| 2912 | - | - | - | - | - | - | - | - | - |
| 2913 | 0.61 | 1.31 | 2.18 | - | 1.83 | 1.22 | 1.56 | 0.35 | 1.39 |
| 2914 | 1.08 | 1.59 | 0.70 | 0.76 | 1.19 | 0.97 | 0.75 | 0.66 | 1.04 |
| 3012 | - | - | - | - | - | - | - | - | - |
| 3013 | - | - | - | - | - | - | - | - | - |
| 3014 | 0.71 | 1.78 | 0.85 | 0.60 | 0.99 | 0.81 | 0.55 | 0.59 | 0.96 |
| 3015 | 0.80 | 1.51 | 0.72 | 0.73 | 1.06 | 0.65 | 0.46 | 0.55 | 0.88 |
| 3112 | - | - | 1.22 | 0.91 | - | - | - | - | 1.06 |
| 3113 | - | - | 0.69 | - | - | 0.44 | 0.52 | - | 0.61 |
| 3114 | 1.23 | 1.24 | 0.70 | 0.61 | 0.99 | 1.23 | 0.59 | 0.32 | 0.94 |
| 3115 | 0.77 | 1.28 | 0.75 | 0.82 | 0.84 | 0.55 | 0.50 | 0.55 | 0.81 |
| 3212 | - | - | - | - | - | - | - | - | - |
| 3213 | - | - | - | - | - | - | - | - | - |
| 3214 | - | 1.21 | 1.11 | 1.13 | 0.87 | 0.76 | 0.48 | 0.75 | 0.91 |
| 3215 | 0.75 | 1.42 | 0.81 | 0.83 | 0.79 | 0.53 | 0.65 | 0.80 | 0.87 |
| 3314 | - | 0.70 | 1.35 | 1.10 | 1.03 | 0.68 | 0.53 | 0.46 | 1.01 |
| 3315 | 0.53 | 0.94 | 1.11 | 0.96 | 0.94 | 0.66 | 1.00 | 0.63 | 0.90 |
| 3414 | - | - | - | - | - | - | - | - | - |
| TOTAL | 0.89 | 1.41 | 0.74 | 0.74 | 1.17 | 0.93 | 0.66 | 0.61 | 0.95 |

*- = NO RECORD OF FISHING

TOTAL CATCH = 10047242 KG

TOTAL FISHING EFFORT = 10595865 POT LIFTS

TABLE 3: MEAN CARAPACE LENGTHS (MM) OF MALE AND FEMALE ROCK LOBSTERS IN VARIOUS DEPTH CATEGORIES AT FREMANTLE, LANCELIN, JURIEN AND DONGARA THROUGHOUT THE FISHING SEASON.

| YEAR | AREA | MONTH | 0-10 FMS | | 10-20 FMS | | 20-30 FMS | | 30+FMS | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | MALE | FEMALE | MALE | FEMALE | MALE | FEMALE | MALE | FEMALE |
| 1977/78 | FREMANTLE | NOV | 78 | 76 | | | | | | |
| | | DEC | 76 | 74 | | | 86 | 85 | | |
| | | JAN | 75 | 73 | | | 90 | 98 | 108 | 105 |
| | | FEB | 74 | 71 | 83 | 80 | 99 | 97 | | |
| | | MAR | 76 | 74 | 99 | 85 | 109 | 97 | | |
| | | APR | 77 | 74 | | | 107 | 90 | | |
| | | MAY | 74 | 72 | | | 115 | 99 | | |
| | | JUN | 78 | 74 | | | 127 | 110 | | |
| 1977/78 | LANCELIN | NOV | 74 | 74 | | | | | | |
| | | DEC | | | | | | | 92 | 88 |
| | | JAN | 74 | 72 | 76 | 77 | 91 | 90 | | |
| | | FEB | 74 | 71 | | | 93 | 85 | | |
| | | MAR | 75 | 72 | | | | | | |
| | | APR | 73 | 71 | | | | | | |
| | | MAY | 73 | 72 | | | | | | |
| | | JUN | 74 | 72 | | | | | | |
| 1977/78 | JURIEN | NOV | 73 | 72 | | | | | | |
| | | DEC | | | 77 | 77 | 80 | 79 | 79 | 76 |
| | | JAN | 74 | 72 | | | | | | |
| | | FEB | 72 | 70 | | | | | | |
| | | MAR | 75 | 72 | | | 85 | 80 | | |
| | | APR | 78 | 75 | | | | | | |
| | | MAY | 76 | 73 | | | 93 | 83 | | |
| | | JUN | 74 | 71 | 81 | 77 | | | | |
| 1977/78 | DONGARA | NOV | 71 | 70 | | | | | | |
| | | DEC | 71 | 68 | | | 82 | 79 | | |
| | | JAN | 77 | 76 | | | | | 92 | 90 |
| | | FEB | 75 | 73 | 77 | 75 | | | 93 | 93 |
| | | MAR | 79 | 75 | 80 | 77 | 82 | 79 | | |
| | | APR | 78 | 76 | | | | | 95 | 86 |
| | | MAY | 77 | 75 | | | 108 | 94 | | |
| | | JUN | 76 | 73 | 76 | 74 | | | | |

TABLE 4: BOTTOM TEMPERATURE ($^{o}$C) AND SURFACE SALINITY IN PARTS PER THOUSAND FOR FREMANTLE, LANCELIN, JURIEN AND DONGARA OF WATERS BETWEEN VARIOUS DEPTH CONTOURS FOR THE 1977/78 SEASON

| AREA | DEPTH FATH. | NOV | | DEC | | JAN | | FEB | | MAR | | APR | | MAY | | JUN | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Temp | Sal | Temp | Sal | Temp | Sal | Temp | Sal | Temp | Sal | Temp | Sal | Temp | Sal | Temp | Sal |
| FREMANTLE | 0-10 | 20.9 | 35.90 | 21.2 | 35.91 | 22.6 | 35.83 | 22.2 | - | 24.2 | - | 22.0 | 35.59 | 20.0 | 35.96 | 17.0 | 35.74 |
| | 10-20 | | | | | | | | | - | 35.92 | | | | | | |
| | 20-30 | | | 20.6 | 35.74 | 22.3 | 35.87 | 21.2 | 35.89 | | | | | 21.3 | 35.75 | 22.0 | - |
| | 30+ | | | | | 21.1 | - | | | | | | | | | | |
| LANCELIN | 0-10 | 21.7 | 35.96 | | | 22.3 | 35.80 | 22.8 | 36.19 | 23.2 | 36.21 | 21.8 | 35.69 | 21.1 | 35.69 | 16.2 | 35.57 |
| | 10-20 | | | | | 21.6 | 35.32 | | | | | | | | | | |
| | 20-30 | | | | | 21.8 | 35.81 | 21.2 | 35.90 | | | | | | | | |
| | 30+ | | | 21.3 | 35.82 | | | | | | | | | | | | |
| JURIEN | 0-10 | 20.9 | 36.15 | | | 22.3 | 36.12 | 22.7 | 36.13 | 22.0 | 36.05 | 20.2 | 36.07 | 20.0 | 35.57 | 19.0 | 35.52 |
| | 10-20 | | | 23.2 | 35.77 | | | | | | | | | | | 19.0 | 35.55 |
| | 20-30 | | | 22.4 | 35.61 | | | | | 22.6 | 35.70 | | | - | 35.48 | | |
| | 30+ | | | 22.9 | 35.73 | | | | | | | | | | | | |
| DONGARA | 0-10 | 21.3 | 36.29 | 22.4 | 35.84 | 22.9 | 35.84 | 20.5 | 36.75 | 23.0 | - | - | 35.80 | 20.5 | 35.86 | 19.0 | 35.71 |
| | 10-20 | | | | | | | 20.9 | 35.78 | 23.4 | - | | | | | 19.7 | 35.62 |
| | 20-30 | | | 22.8 | 35.78 | | | | | 23.2 | 35.83 | | | 22.0 | 35.62 | | |
| | 30+ | | | | | 22.2 | 35.63 | 22.0 | 35.78 | | | - | 35.44 | | | | |

TEMPERATURES WERE TAKEN USING A PROTECTED REVERSING THERMOMETER AND SURFACE WATER SAMPLES WERE TAKEN AND LATER ANALYSED TO DETERMINE SALINITY.

TABLE 5: 1977/78 SEX RATIO BY MONTH AND DEPTH CATEGORY, FIGURES ARE % OF FEMALES IN THE TOTAL SAMPLED CATCH.

| AREA | DEPTH RANGE FATH. | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN |
|---|---|---|---|---|---|---|---|---|---|
| DONGARA | 0-10 | 54 | 45 | 46 | 51 | 56 | 56 | 58 | 60 |
| | 10-20 | | | | 60 | 58 | | | 58 |
| | 20-30 | | 54 | | | 67 | | 77 | |
| | 30+ | | | 84 | 76 | | 77 | | |
| JURIEN | 0-10 | 53 | | 56 | 51 | 50 | 43 | 53 | 56 |
| | 10-20 | | 52 | | | | | | 55 |
| | 20-30 | | 55 | | | 61 | | 58 | |
| | 30+ | | 62 | | | | | | |
| LANCELIN | 0-10 | 52 | | 50 | 57 | 64 | 61 | 60 | 65 |
| | 10-20 | | | 49 | | | | | |
| | 20-30 | | | 56 | 68 | | | | |
| | 30+ | | 67 | | | | | | |
| FREMANTLE | 0-10 | 51 | 57 | 49 | 42 | 51 | 56 | 54 | 56 |
| | 10-20 | | | | 60 | 52 | | | |
| | 20-30 | | 66 | 67 | 64 | 67 | 56 | 56 | 70 |
| | 30+ | | | 69 | | | | | |

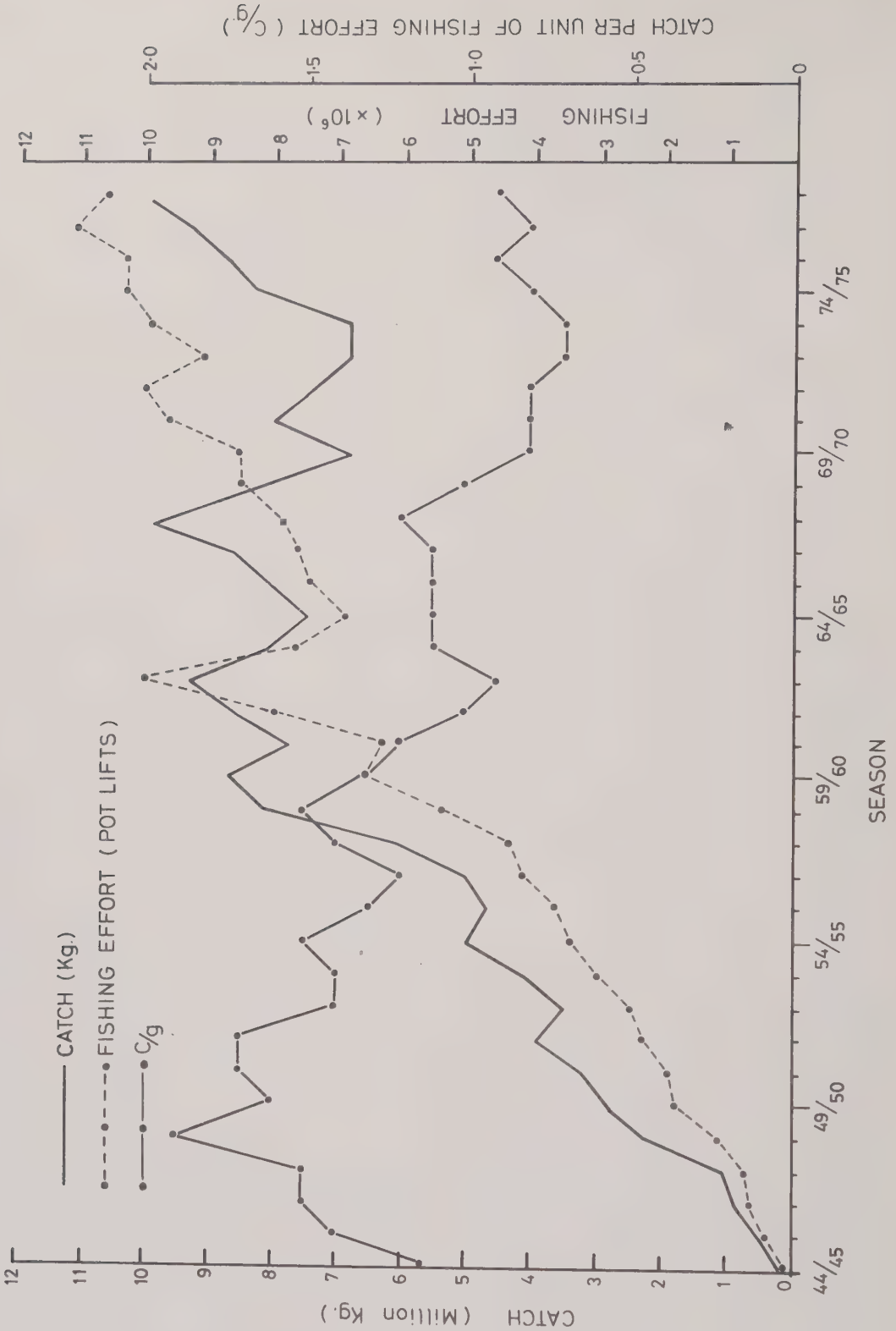


Figure 1. Rock Lobster Catch (kg), Fishing Effort (pot lifts)* and Catch per Unit of Fishing Effort (c/g) Data.

* Prior to this report fishing effort was calculated as effective fishing effort by the method of Gulland (1969). The complete set of fishing effort data shown here (1944/45 to 1977/78) is obtained as described in the footnote on page 2.

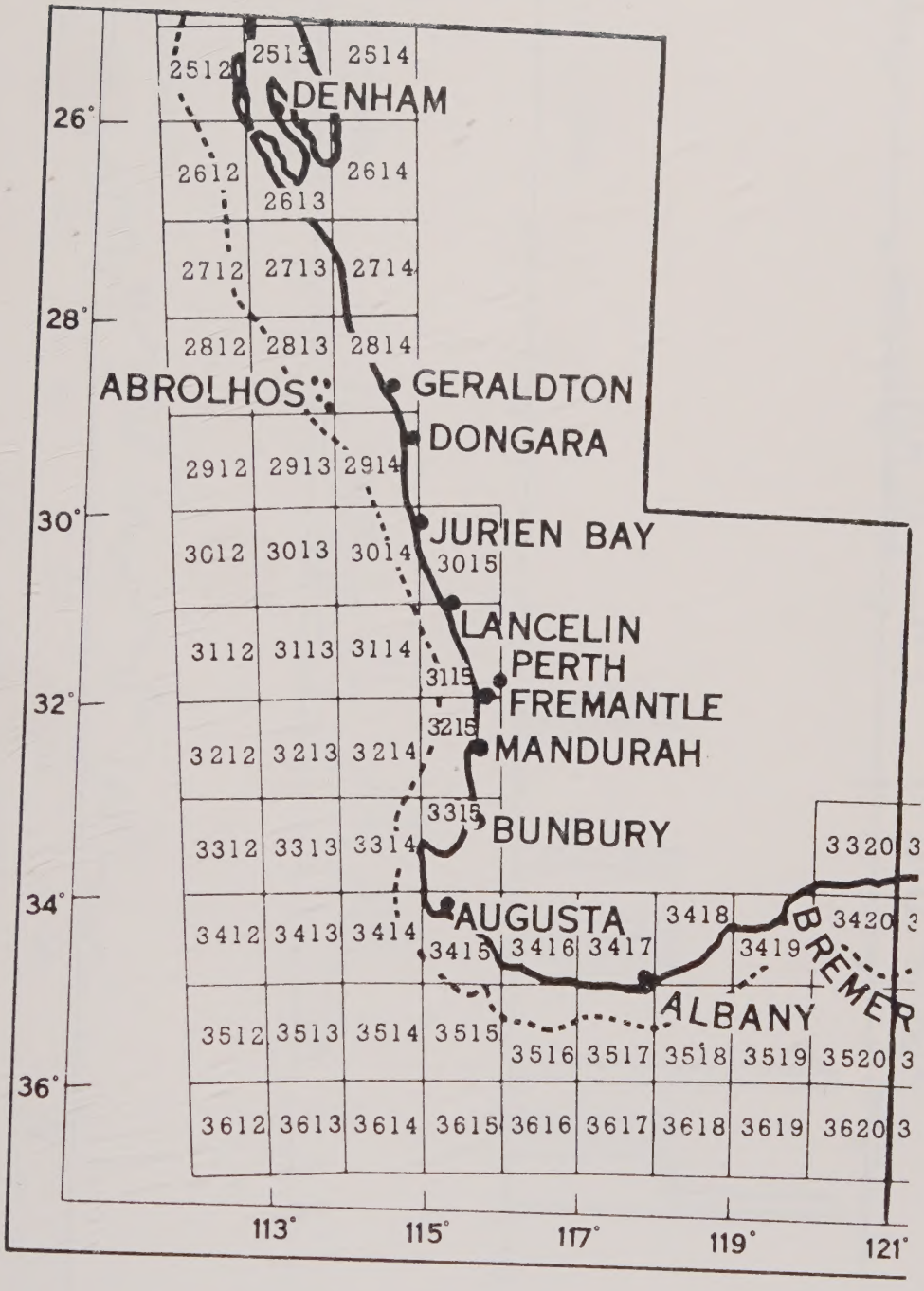


FIGURE 2. Rock Lobster Fishing Areas

34493/7/84—1M—S/7142

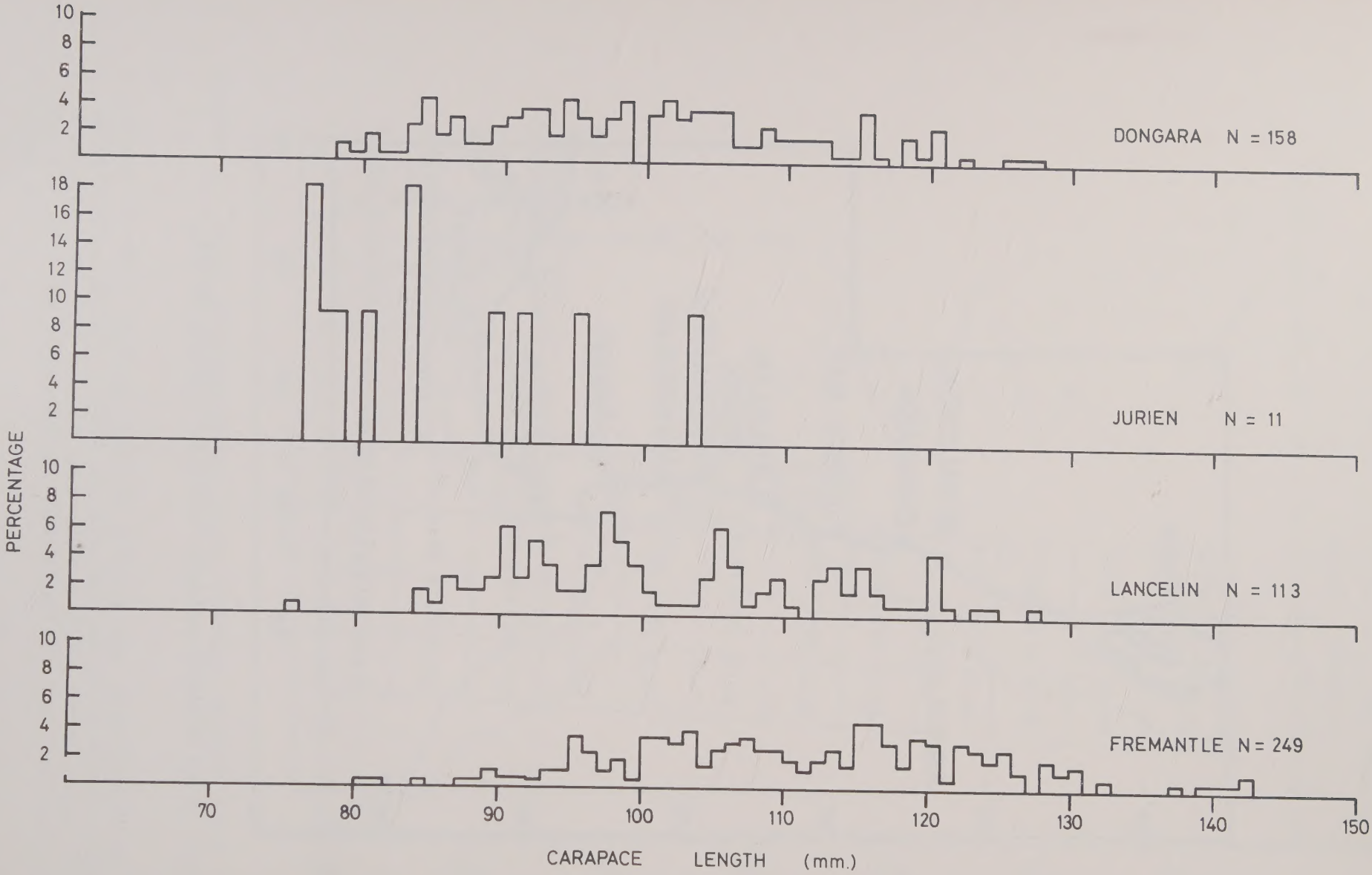


Figure 3. Length frequency of breeding female rock lobsters taken from December 1977 to February 1978.

WILLIAM C. BROWN, Government Printer, Western Australia

ISSN 0726–0733
ISBN 0 7309 0321 4